

Aircrew & Flightline Tasks



24 May 2004

Developed as part of the
National Emergency Services Curriculum Project

O-2003
GRID SECTIONAL CHARTS

CONDITIONS

You are a Mission Observer trainee and must grid and use gridded sectional charts.

OBJECTIVES

Grid a sectional chart using the CAP and the Standardized Lat/Long Grid systems.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, knowing how to grid a sectional chart and use grids is essential in order to assist the mission pilot in planning a search, and to maintain situational awareness during a search.
2. CAP grid system. The sectional grid system used by Civil Air Patrol divides each sectional's area into 448 smaller squares. The latitude and longitude boundaries of each sectional chart are shown below. The St. Louis chart, for example, covers an area that is bounded by the following latitudes and longitudes: North 40° 00' (north boundary), North 36° 00' (south boundary), West 91°-00' (west boundary), and West 84°-00' (east boundary).

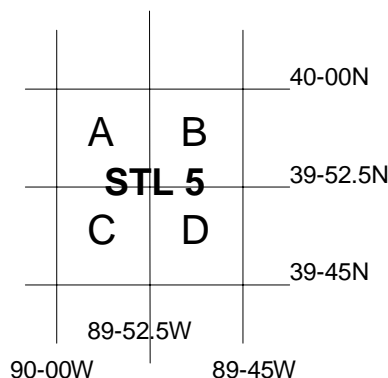
Chart	Identifier	North Grid Limit	South Grid Limit	West Grid Limit	East Grid Limit	Total Grids
Seattle	SEA	49-00N	44-30N	125-00W	117-00W	576
Great Falls	GTF	49-00N	44-30N	117-00W	109-00W	576
Billings	BIL	49-00N	44-30N	109-00W	101-00W	576
Twin Cities	MSP	49-00N	44-30N	101-00W	93-00W	576
Green Bay	GRB	48-15N	44-00N	93-00W	85-00W	544
Lake Huron	LHN	48-00N	44-00N	85-00W	77-00W	512
Montreal	MON	48-00N	44-00N	77-00W	69-00W	512
Halifax	HFX	48-00N	44-00N	69-00W	61-00W	512
Klamath Falls	LMT	44-30N	40-00N	125-00W	117-00W	576
Salt Lake City	SLC	44-30N	40-00N	117-00W	109-00W	576
Cheyenne	CYS	44-30N	40-00N	109-00W	101-00W	576
Omaha	OMA	44-30N	40-00N	101-00W	93-00W	576
Chicago	ORD	44-00N	40-00N	93-00W	85-00W	512
Detroit	DET	44-00N	40-00N	85-00W	77-00W	512
New York	NYC	44-00N	40-00N	77-00W	69-00W	512
San Francisco	SFO	40-00N	36-00N	125-00W	118-00W	448
Las Vegas	LAS	40-00N	35-45N	118-00W	111-00W	476
Denver	DEN	40-00N	35-45N	111-00W	104-00W	476
Wichita	ICT	40-00N	36-00N	104-00W	97-00W	448
Kansas City	MKC	40-00N	36-00N	97-00W	90-00W	448
St. Louis	STL	40-00N	36-00N	91-00W	84-00W	448
Cincinnati	CVG	40-00N	36-00N	85-00W	78-00W	448
Washington	DCA	40-00N	36-00N	79-00W	72-00W	448
Los Angeles	LAX	36-00N	32-00N	121-30W	115-00W	416
Phoenix	PHX	35-45N	31-15N	116-00W	109-00W	504
Albuquerque	ABQ	36-00N	32-00N	109-00W	102-00W	448
Dallas-Ft. Worth	DFW	36-00N	32-00N	102-00W	95-00W	448
Memphis	MEM	36-00N	32-00N	95-00W	88-00W	448
Atlanta	ATL	36-00N	32-00N	88-00W	81-00W	448
Charlotte	CLT	36-00N	32-00N	81-00W	75-00W	384
El Paso	ELP	32-00N	28-00N	109-00W	103-00W	384
San Antonio	SAT	32-00N	28-00N	103-00W	97-00W	384
Houston	HOU	32-00N	28-00N	97-00W	91-00W	384
New Orleans	MSY	32-00N	28-00N	91-00W	85-00W	384
Jacksonville	JAX	32-00N	28-00N	85-00W	79-00W	384
Brownsville	BRO	28-00N	24-00N	103-00W	97-00W	384
Miami	MIA	28-00N	24-00N	83-00W	77-00W	384

The process begins by dividing the whole area into twenty-eight *1-degree* grids, using whole degrees of latitude and longitude. Then each 1-degree grid is divided into four *30-minute* grids, using the 30-minute latitude and longitude lines as shown in Figure 8-22. Finally, each of the 30-minute grids is divided into four *15-minute* grids, using the 15- and 45-minute latitude and longitude lines.

Next, the grid squares are numbered 1 through 448 beginning usually with the most northwest square on the entire sectional, and continuing straight east through number 28. The numbering resumes in the second row, with number 29 placed beneath number 1, 30 beneath 2, and so on through 56. The third row begins with number 57 beneath numbers 1 and 29, and continues through 84. Numbering continues through successive rows until all 448 squares have a number.

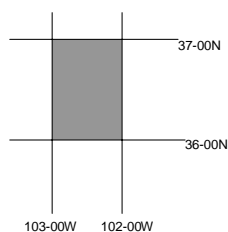
In cases where two sectionals overlap one another, the Civil Air Patrol always uses the numbering system for the western-most chart of the two in question. You can see this where the overlap area between 90° 00' and 91° 00', shown in the first 4 vertical columns, is identified with Kansas City (MKC) grid numbering, not St. Louis. Note too that, since the Kansas City grid numbering is used in this overlap area, the first 4 columns of the St. Louis grid numbering system are omitted. Several other such overlaps exist within the grid system.

When circumstances require, a 15-minute grid can be divided into 4 more quadrants using 7 1/2 minute increments of latitude and longitude, creating 4 equal size grids that are approximately 7 1/2 miles square. The quadrants are then identified alphabetically - A through D - starting with the northwest quadrant as A, northeast as B, southwest as C and southeast as D, as shown below. A search area assignment in the southeast quadrant may be given as "Search STL 5D."

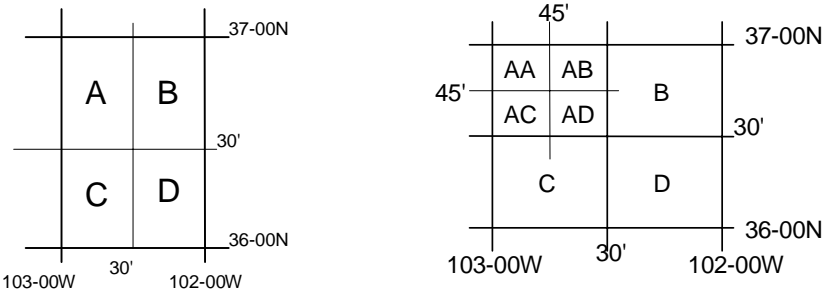


Pinpointing an area within the grid system becomes easy once you gain familiarity with the grids' many uses. You soon will be able to quickly plot any area on a map and then fly to it using the basic navigation techniques already discussed.

3. Another means of designating a grid system is the Standardized Latitude and Longitude Grid System. It has an advantage over the sectional standardized grid in that it can be used on any kind of chart that has lines of latitude and longitude already marked. In this system, 1-degree blocks are identified by the intersection of whole numbers of latitude and longitude, such as 36-00N and 102-00W. These points are always designated with the latitude first, such as 36/102, and they identify the area north and west of the intersection of these two lines. In the figure below, the gray shading identifies section 36/102.



Next, the 1-degree grid is divided into 4 quadrants using the 30-minute lines of latitude and longitude. Label each quadrant A through D; the northwest quadrant being 36/102A, the northeast 36/102B, the southwest 36/102C, and the southeast 36/102D as shown in the figure below (left). Each quadrant can also be divided into four sub-quadrants, labeled AA, AB, AC, and AD, again starting with the most northwest and proceeding clockwise, as shown the figure below (right). This grid system works on any chart that has latitudes and longitudes printed on it.



Additional Information

More detailed information and figures on this topic are available in Chapter 8 of the MART. Attachment 1 of the MART is a reproduction of Attachment E of the *U.S. National SAR Supplement to the International Aeronautical and Maritime SAR Manual*.

Evaluation Preparation

Setup: Provide the student with Appendix E of the *U.S. National SAR Supplement to the International Aeronautical and Maritime SAR Manual* (Attachment 1 of MART), a sectional chart and a plotter. Give the student a sectional (may be out-of-date) and a gridding assignment.

Brief Student: You are an Observer trainee asked grid a sectional chart, using both the CAP and the Standardized Latitude and Longitude Grid systems.

Evaluation

Performance measures	Results
Given Appendix E of the <i>U.S. National SAR Supplement to the International Aeronautical and Maritime SAR Manual</i> (Attachment 1 of MART), a sectional chart, and a plotter:	
1. Grid a sectional using the CAP grid system.	P F
2. Given coordinates, draw a grid on the sectional using the Standardized Latitude and Longitude Grid System.	P F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2004
USE A POD TABLE

CONDITIONS

You are a Mission Observer trainee and must demonstrate basic knowledge of search planning and the use of the POD table.

OBJECTIVES

Demonstrate basic knowledge of how search planners determine the Maximum Area of Possibility and Probability Area. Use a POD table to discuss the advantages and disadvantages of various search altitudes and speeds over various types of terrain.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, basic knowledge of search planning and being able to use the POD table is helpful.
2. The first task in planning a search and rescue mission is to establish the most probable position of the crash site or survivors. If witnesses or other sources provide reliable information concerning an accident, the location may be established without difficulty. If there is little or no information, the planning section chief faces a more difficult task. Regardless of the information available, the planning section chief always prepares a chart to assist in focusing the search and locating the crash site or survivors as quickly as possible.
3. When defining search area limits, the planning section chief first sketches the maximum possibility area. This can focus the initial search in the most likely area and allows use of the charted area to help screen sightings and other reports. Again, the area is roughly circular, centered on the last known position of the missing aircraft. The radius approximates the distance the objective aircraft might have traveled, given the amount of fuel believed aboard at its last known position, and the wind direction and speed. The area is circular because it's always possible the missing pilot may have changed directions following his last known position and flown until his fuel was exhausted.
4. To chart the Maximum Area of Possibility, the planning section chief requires the missing aircraft's last known position, wind direction and velocity, and an estimate of the missing aircraft's fuel endurance and airspeed. If none of this information is available the task is much more difficult, and the search plan is usually based on an assumption that the missing aircraft is located along or near its intended course.
5. Plotting the probability area, the area in the possibility circle where the searchers are most likely to find the aircraft, is the second major factor in search planning. The probability area is determined by the accuracy of the last known position (LKP) in the possibility circle. When this information is not available, the planning section chief must rely on less specific secondary sources of information.

Based on experience and the accuracy of available information, the planning section chief defines an area of highest priority to initiate the search. The first search area may be called probability area one: this area begins around the last known position, extends along the intended route, and ends around the intended destination. If a search of probability area one produces negative results, the search may be expanded to cover probability area two, an extension of area one. If this search is unsuccessful, the search area is adjusted once more.

6. Organization is an important element in search planning. The time it takes to locate downed aircraft or survivors could depend on the definition and charting of the search area. As an observer, you should become familiar with each designated search area before the mission is launched. You should use current charts and maps which will enable you to provide additional navigational assistance in accurately positioning the search aircraft over the properly designated area.

7. The size of the search objective, weather, visibility, and ground cover in the search area must be considered when determining the altitude and airspeed for a visual search. Over non-mountainous terrain, a search altitude between 800 and 2000 feet above the terrain is normally used for a visual search. The search visibility and the terrain conditions may affect this selection. As altitude decreases below 500 feet, search effectiveness may actually decrease, due to the "rush effect" of objects on the ground passing through the scanner's field of view more rapidly.

Depending upon the number of search aircraft available, planners may also consider the desired probability of detection when selecting an altitude for the search pattern. Although a probability of detection chart is normally used to estimate POD *after* a search, its use here allows planners to predetermine a mission's chance of success. The POD table shows data for: open, flat terrain; hilly terrain and/or moderate ground cover; and very hilly and/or heavily covered terrain. To the right in the columns beneath "Search Visibility" you see what are, in this case, the desired probabilities of detection. Looking at the open/flat terrain and using 1-mile track spacing, you can see that all three altitudes give at least 50% POD, but a search at 1000 feet above the terrain gives 60%, or 10% *more* POD, than does a search at 500 feet. Over open terrain, where flight and search visibility are not limiting factors, the table demonstrates that a higher altitude is more likely to yield positive results on a single sortie. Notice that the highest POD, 85%, is obtained when flying at 1,000 feet above the ground using a track spacing of 0.5 nm.

OPEN, FLAT TERRAIN					MODERATE TREE COVER AND/OR HILLY					HEAVY TREE COVER AND/OR VERY HILLY				
SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY				SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY				SEARCH ALTITUDE (AGL)	SEARCH VISIBILITY			
Track Spacing	1 mi	2 mi	3 mi	4 mi	Track Spacing	1 mi	2 mi	3 mi	4 mi	Track Spacing	1 mi	2 mi	3 mi	4 mi
500 Ft					500 Ft					500 Ft				
.5 mi	35%	60%	75%	75%	.5 mi	20%	35%	50%	50%	.5 mi	10%	20%	30%	30%
1.0	20	35	50	50	1.0	10	20	30	30	1.0	5	10	15	15
1.5	15	25	35	40	1.5	5	15	20	20	1.5	5	5	10	15
2.0	10	20	30	30	2.0	5	10	15	15	2.0	5	5	10	10
700 Ft					700 Ft					700 Ft				
.5 mi	40%	60%	75%	80%	.5 mi	20%	35%	50%	55%	.5 mi	10%	30%	30%	35%
1.0	20	35	50	55	1.0	10	20	30	35	1.0	5	10	15	20
1.5	15	25	40	40	1.5	10	15	20	25	1.5	5	5	10	15
2.0	10	20	30	35	2.0	5	10	15	20	2.0	5	5	10	10
1000 Ft					1000 Ft					1000 Ft				
.5 mi	40%	65%	80%	85%	.5 mi	25%	40%	55%	60%	.5 mi	15%	20%	30%	35%
1.0	25	40	55	60	1.0	15	20	30	35	1.0	5	10	15	20
1.5	15	30	40	45	1.5	10	15	20	25	1.5	5	10	10	15
2.0	15	20	30	35	2.0	5	10	15	20	2.0	5	5	10	10

If weather or visibility are not limiting factor, why then don't you just always elect to fly *that* track spacing at 1,000 feet, and always try to obtain that highest of probabilities of detection? You should recall, from the earlier maximum probability area, that you start with a very large area and then try to focus your efforts on smaller probability areas within that larger area. If the incident commander has received a number of leads that have reduced the probable area to a small size, he might task you to fly exactly that track spacing and altitude. If the area is not so small, and you try to fly 1/2- rather than 1-mile track spacing, you will obviously take *twice* as long to cover the whole area.

8. Execution of search patterns. The incident commander and his staff take into consideration many variables including weather, visibility, aircraft speed, and availability of aircraft and crew resources, experience, and urgency of the situation when developing the search plan. Similarly, the planning section chief considers many variables when selecting the search pattern or patterns to be used. Individual search patterns are covered in

chapters that follow. All questions about how the search is to be conducted must be resolved at the mission briefing. When airborne, crews must focus on executing the briefed plan instead of second-guessing the general staff and improvising. If, for whatever reason, you deviate from the planned search patterns it is imperative that you inform the staff of this during your debriefing.

Additional Information

More detailed information and figures on this topic are available in Chapter 9 of the MART.

Evaluation Preparation

Setup: Provide the student with search planning figures (e.g., Chapter 9 of the MART) and a POD table.

Brief Student: You are an Observer trainee asked to discuss basic search planning and use a POD table.

Evaluation

<u>Performance measures</u>	<u>Results</u>	
1. Discuss how search planners determine the Maximum Area of Possibility and the Probability Area.	P	F
2. Using a POD table, discuss the advantages and disadvantages of various search altitudes and speeds over the three major types of terrain.	P	F
3. Discuss the importance of proper execution of search patterns.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

DEMONSTRATE AIR/GROUND TEAM COORDINATION TECHNIQUES

CONDITIONS

You are a Mission Observer trainee and must demonstrate how to coordinate with ground teams.

OBJECTIVES

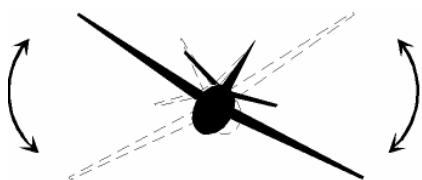
Demonstrate and discuss air and ground team coordination plans and techniques.

TRAINING AND EVALUATION

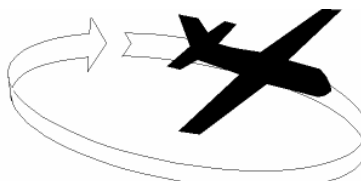
Training Outline

1. As a Mission Observer trainee, the ability to coordinate with ground teams is essential.
2. Naturally, the best means of working with a ground team is to use the radio. The observer and scanner should continuously have their eyes on the ground team; this frees you to fly the aircraft. The observer and/or scanner will work the radio to execute the coordination. The observer will likely also have to be the one who keeps track of where you “left” your target. Sometimes you may be the one using the radio.
 - a. It is important to understand that you have the advantage of perspective; the long-range visibility that is inherent to flying is absent from the ground. You can see over the hills, trees, and other obstacles that are blocking the ground team member's sight, so you may have to explain the situation to the ground pounder in painstaking detail.
 - b. Another perspective problem is time: time seems to pass very slowly while waiting for a ground team, and it is easy to get impatient and leave station prematurely.
 - c. Sometimes the ground team member (non-CAP, of course) may not understand radio jargon, so use plain English. For example, if you wanted a ground team to take a left at the next intersection, what would you say? How about “Ground Team 1, CAP Flight 4239, turn left at the next intersection, over.” Most often the plain English answer is the correct way to say it in radioese, anyway.
3. It is important to brief the mission with the ground team, if possible, and at least agree on communications frequencies and lost-comm procedures, maps/charts to be used by *both* teams, determine what vehicle the ground team is driving (e.g., type, color, and any markings), determine what the ground team members are wearing (highly visible vests are preferred), and a rendezvous point and time window for rendezvous (+/- 15 minutes). One tried-and-true method is to rendezvous at a landmark that both the aircrew and the ground team can *easily* identify. A common rendezvous point is an intersection of prominent roads; these are easily identifiable by both the aircrew and ground team. The rendezvous location should be set up before you leave.
4. Also, ground teams that have a hand-held GPS can radio their latitude and longitude coordinates to you and say, “Come and get me!” If you are unable to loiter over the target and bring the ground team to it, you can simply radio the coordinates to the ground team and let them navigate to it on their own. This is not nearly as efficient, however, as when you lead them to it. Note that two pieces of technology have to be working properly to make this work: 1) both air and ground operators need to be proficient with their GPS units and 2) two-way radio communication must be established and maintained.
5. It is important to plan for a loss of communications during the briefing. The teams should agree on pre-arranged signals such as: stopping the vehicle means lost comm; blinking headlights indicate the message has been received; and operating the flashers means the message hasn't been received.

If communications are lost, you have a limited number of signals that can be given using the aircraft itself, as illustrated below. These signals serve as a standard means to acknowledge receiving and understanding signals from the ground. An "affirmative, I understand" response to a survivor's signal can often be a morale booster, and renew hope for imminent rescue.



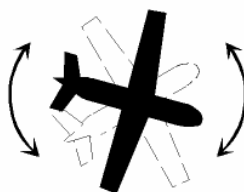
a. Message received and understood



b. Message received but NOT understood



c. Yes or affirmative

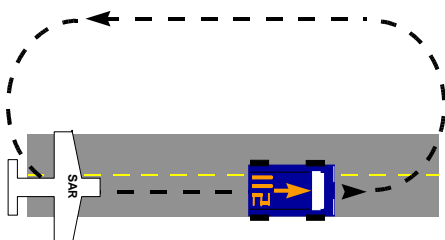


d. No or negative

In addition to the four signals shown above, there are two more that you can use to communicate with ground rescue teams. First, if you believe a ground team should investigate an area, you may fly over the team, "race" the engine or engines, and then fly in the direction the team should go. Repeat this maneuver until the ground team responds or until another means of communication is established.

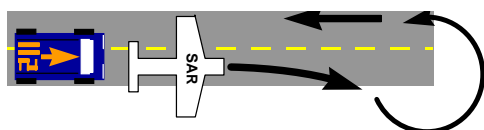
Second, you may pinpoint an area for investigation by circling above the area, continuing to do so until the ground team reaches the area and begins the search. The better the communication from ground-to-air and air-to-ground, the more coordinated the search will be and the greater the chances for success. Below are some patterns you may use to guide a ground team:

Keeping contact with the ground team.



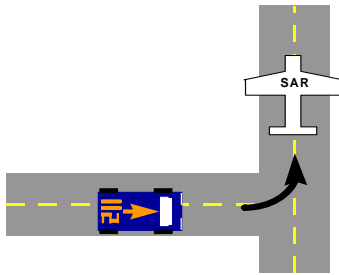
- Aircraft action: Aircraft approaches the vehicle from the rear and turns in a normal manner right (or left) to re-approach the vehicle from the rear. Circle back as necessary using oval patterns and flying over the team from behind, indicating that they should continue. This process may be referred to as a "Daisy Chain." Daisy Chain over the ground team as long as necessary.
- Desired team action: Continue driving in indicated direction along this road.

Turning the ground team around.



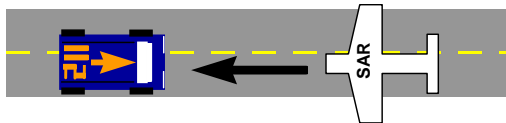
- Aircraft action: Aircraft approaches the vehicle from the rear and then turns sharply right (or left) in front of the vehicle while in motion. Circle back as necessary, flying against the team's direction of travel, and then take up the 'keeping up' procedure outlined above.
- Desired team action: Turn vehicle around.

Turn.



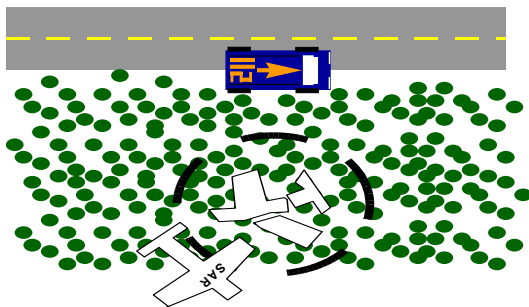
- Aircraft action: Aircraft approaches the vehicle from the rear and then turns sharply right (or left) in front of the vehicle while in motion. Circle back as necessary using oval patterns and flying over the team from behind, indicating that they should continue.
- Desired team action: Turn vehicle to right (or left) at the same spot the aircraft did and then continue in that direction until further signals are received.

Stop or Dismount.



- Aircraft action: Aircraft approaches the vehicle low and head-on while the vehicle is moving.
- Desired team action: Stop the vehicle and await further instructions.
- Aircraft action: Aircraft makes two (or more) passes in same direction over a stopped ground team.
- Desired team action: Get out of the vehicle, then follow the aircraft and obey further signals (proceed on foot).

Objective is here.



- Aircraft action: Aircraft circles one geographic place.
- Desired team action: Proceed to the location where the low wing of the aircraft is pointing; that is the location of the target.

Additional Information

More detailed information on this topic is available in Chapter 4 and Attachment 2 of the MART.

Evaluation Preparation

Setup: The trainee needs an aircrew and a ground crew.

Brief Student: You are a Mission Observer trainee asked to guide ground units with and without comm.

Evaluation

Performance measures

Results

- | | | |
|---|---|---|
| 1. Discuss crew responsibilities during a combined air/ground team mission. | P | F |
| 2. Discuss factors to consider before you or the ground team leaves mission base. | P | F |
| 3. Demonstrate basic ground team coordination, with and without comm. | P | F |

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

O-2101
DESCRIBE HOW ELTs ARE DETECTED

CONDITIONS

You are a Mission Observer trainee and must describe how ELTs are detected and a search is launched.

OBJECTIVES

Describe how ELTs are detected and a search is launched.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, knowing the types of Emergency Locator Transmitters (ELTs), how they can be detected, and how a search is launched is essential. While the observer's role seems to be concentrated in visual searches, her contributions in electronic searches are no less important. The observer's understanding of electronic search techniques, and her ability to assist the pilot, can substantially increase both search effectiveness and the timeliness of recovering accident victims.

2. Types of ELTs. The Federal Aviation Administration (FAA) requires most U.S.-registered aircraft to have operable ELTs installed, which activate automatically when sensing acceleration forces during an accident. An active ELT transmits a continuous radio signal on a specific frequency until it's either deactivated or its battery discharges: most transmit on 121.5 MHz at 60-100 milliwatts (less power than a small flashlight). [Note: After 01FEB09, advanced ELTs that transmit on 406.025 MHz at 25 milliwatts are to be used. They are specifically designed to operate with the Cospas-Sarsat satellite system, and transmit data that contains a unique identifier number that links them to a database containing information on the vessel or aircraft and emergency points of contact. Some advanced 406 MHz beacons also transmit GPS coordinates.]

Military Beacons (e.g., URT-33/C) operate on 253 MHz. Personnel ejecting/parachuting from a military aircraft have this beacon; some pilots may be able to communicate via two-way radio on 243 MHz using a PRC-90 or later military survival radio (this radio also has a beacon mode).

Marine Emergency Position Indicating Radio Beacons (*EPIRBs*) are primarily found on boats and ships. Similar to ELTs, some are automatically activated while others can only be activated manually.

Personal Locator Beacons (PLBs) and Personal Emergency Transmitters (PETs) are currently illegal for general use in the U.S., but the law is about to be changed and they are presently used by some government agencies. They transmit on 121.5 MHz, 243 MHz and 406 MHz or a combination: the new law proposes to license only the 406 MHz version.

Test stations or *practice beacons* like those used by CAP transmit on 121.775 MHz. Some organizations still operate practice beacons on 121.6 MHz, but all CAP practice beacons should be converted by now. [NOTE: **Avoid calling the practice beacon an "ELT"** while communicating on the radio; this can cause confusion. The term "practice beacon" is very clear to all concerned and should be used on all drills and exercises.]

3. Approximately 97% of all received ELT signals turn out to be false alarms. For 121.5 MHz ELTs only 1 in 1000 signals is an actual emergency! False alarms cause problems because SARSAT can only monitor 10 ELT signals at a time and because they block the emergency frequencies (thus blocking a real emergency signal). However, you must *always treat an ELT signal as an emergency* because you can't know whether the signal is real or false.

4. In a cooperative effort among several nations, search and rescue-dedicated satellites (SARSAT and COSPAS) orbit the earth and alert to ELT transmissions. Upon receiving an ELT signal, the SARSAT derives the approximate lat/long coordinates of the ELTs position, and the coordinates are passed through the Air Force Rescue Coordination Center (AFRCC) to the incident commander.
5. AFRCC will not launch a search until the signal is picked up by at least two satellites. Also, system accuracy in pinpointing the location varies. For a typical 121.5 MHz ELT, accuracy is limited to a 12 nm radius (452 square nm); a 406 MHZ ELT can be narrowed down to a 2 nm radius (12.5 square nm) and one with GPS can be narrowed down to a 0.05 nm radius (0.008 square nm).
6. Upon receiving SARSAT coordinates, or determining that an ELT was aboard a missing aircraft, the incident commander may launch a combined ELT/visual route search. Search success may depend upon several factors. The fact that an ELT was aboard a missing aircraft does not necessarily guarantee that electronic search procedures will locate it because the unit may have been inoperative or the batteries totally discharged. Also, the crash forces may have been insufficient to activate the ELT or so severe that it was damaged. Incident commanders may attempt to maximize the search effort by conducting an electronic search and a general visual search simultaneously when weather and other circumstances permit.

Additional Information

More detailed information and figures on this topic are available in Chapter 10 of the MART.

Evaluation Preparation

Setup: Provide the student access to an aircraft ELT (or pictures).

Brief Student: You are a Mission Observer trainee asked to describe how ELTs are detected and a search launched.

Evaluation	
<u>Performance measures</u>	<u>Results</u>
1. Discuss the various types of ELTs.	P F
2. Describe how an ELT is detected and a search is launched.	P F
Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.	

P-2001
DISCUSS MISSION PILOT DUTIES AND RESPONSIBILITIES

CONDITIONS

You are a Mission Pilot trainee and must discuss MP duties and responsibilities.

OBJECTIVES

Discuss Mission Pilot duties and responsibilities.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing your duties and responsibilities is essential.
2. The first and foremost duty of a mission pilot is to fly the aircraft in a safe and proficient manner, following all applicable FAA and CAP rules and regulations. All other duties are secondary to those of the aircraft commander.
3. The second most important duty of a mission pilot is to remember that he or she is the *pilot* -- *not* a scanner. You are the Pilot-in-Command (PIC) and you must never forget that.
4. In addition to the normal duties of a PIC, CAP mission pilots must also perform all the non-scanner duties of the Observer if no qualified observer is on board.
5. In addition to PIC duties, your general duties and responsibilities include:
 - a. Obtain complete briefings and plan the sortie. A good mission pilot always includes the observer during these activities. [Remember, you may be the aircraft commander but you are not always the mission commander; an experienced observer should serve as mission commander whenever possible.]
 - b. Thoroughly brief the crew before the flight (include fuel management).
 - c. Thoroughly brief the crew on their responsibilities during all phases of the flight.
 - d. Obtain a flight release.
 - e. Enforce sterile cockpit rules.
 - f. Fly search patterns as completely and precisely as possible. Report any deviations from the prescribed patterns during debriefing.
 - g. Monitor the observer and ensure all events, sightings and reports are recorded and reported.
 - h. Fill out all forms accurately, completely and legibly.
6. The Mission Pilot needs to know what goes into the observer's log, in order to help inexperienced observers and to be able to keep the log when riding in the right seat. The log is maintained from take-off until landing, and should include all events and sightings. It is important to log the geographical location of the search aircraft at the time of all events and sightings (as a habit, always log the Hobbs time each time you make a report or record an event or sighting). This information is the basis of CAP Form 104, which is passed back to the incident commander and general staff after the debriefing and becomes a part of the total information that is the basis for his subsequent actions and reports. Good logs give the staff a better picture of how the mission is progressing. If sketches or maps are made to compliment a sighting, note this and attach them to the log. The log and all maps and sketches will be attached to the CAPF 104.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 and Attachment 2 of the Mission Aircrew Reference Text (MART).

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART.

Brief Student: You are a Mission Pilot trainee asked about your duties and responsibilities, and to discuss the Observer Log.

Evaluation

<u>Performance measures</u>	<u>Results</u>
1. State the first and foremost duty of the mission pilot.	P F
2. State the second-most important duty of the mission pilot.	P F
3. Discuss general duties and responsibilities.	P F
4. Discuss the information recorded in the Observer Log.	P F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

DISCUSS GENERAL CAP-RELATED SAFETY REQUIREMENTS AND ISSUES

CONDITIONS

You are a Mission Pilot trainee and must discuss general CAP-related safety requirements and issues.

OBJECTIVES

Discuss general CAP-related safety requirements and issues.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing general CAP-related safety requirements and issues is essential.
2. *Flying into and taxiing on unfamiliar airports.* CAP missions often require flying into small, non-towered and unlighted airports. The mission pilot needs to quickly obtain information about these airfields. Of particular importance:
 - a. Runways. Determine length, width, markings and lighting. Is runway alignment compatible with predicted wind direction and strength? If not, what is your alternative?
 - b. Taxiways. Are there any, or will you have to back taxi? Are the taxiways marked and/or lighted?
 - c. If you will be arriving in low visibility conditions or at night, taxi SLOWLY and use a wing walker if necessary. If you can't see the turnoff to the taxiway or the taxiway itself -- STOP.
 - d. Obstacles. Note all near the airport and its approaches.
 - e. Services. Fuel and oil, phone, tie downs, and maintenance. Will they be open when you arrive? Is there a phone number to call after normal hours? If in doubt, call ahead -- most FBOs are glad to assist CAP.
 - f. Local NOTAMS.
3. *Flying into large, busy airports.* Of particular importance:
 - a. Airspace and obstacles. Review airspace layout and restrictions, and note all relevant frequencies (including ATIS, AWOS or ASOS).
 - b. Taxiways. Make sure you have a taxiway diagram, and review it before you land. Brief the crew so they can assist you.
 - c. Local NOTAMS.
4. *Taxiing around and near a large number of aircraft:*
 - a. Follow the taxi plan that is in the Operations Plan, if applicable.
 - b. Taxi no faster than a slow walk when around obstacles.
 - c. When there are no flight line personnel or marshalls available, do not taxi within ten feet of any obstacle; stop, and then proceed at no faster than a slow walk.
 - d. Follow all signals given by flight line personnel. However, use common sense as some of the flight line marshals may have little or no experience. If it looks too close -- STOP.
 - e. Pilot aids such as the *Airport/Facility Directory* or commercial products such as the *Flight Guide* (Airguide Publications, Inc.) are invaluable tools for the CAP mission pilot. One should be carried in the aircraft at all times, and kept *current*. Also, several web sites (e.g., *AOPA*) have very detailed airport layouts available for downloading.
 - f. Another often-overlooked safety measure is reconnoitering the terrain around unfamiliar airports to determine your actions in the event the engine quits on takeoff. Get in the habit of flying a circuit around the airport upon arrival to look for emergency landing areas off the ends of each runway. Ask local pilots

for the best actions to take if you lose an engine on takeoff (from each runway). Also, suggest that mission staff include this information in the general briefing, if necessary.

5. *Squawks*. CAP aircraft have Discrepancy Logs - use them! While private pilots may delay 'minor' repairs, mission pilots should not. Just as ELT missions always seem to occur between midnight and 0dark30, you can bet that a nighttime mission will come up if a landing, taxi, strobe or navigation light is out. Been having troubles with your comm radios? Get ready for an ELT search in Class B airspace.

CAP pilots often fly unfamiliar aircraft during missions. Pay particular attention to each aircraft's squawk sheet, and don't fly unless you are satisfied with the aircraft's condition: question the aircraft's regular crew about the particulars of their aircraft -- probe for "unwritten" squawks.

In a related matter, keeping the aircraft windows clean and having a well-stocked cleaning kit in the aircraft is vital. How many of you have arrived at the airport for a night flight and found that the last pilot had flown through a bug convention and neglected to clean the windscreen? And, as if this isn't enough of a delay in launching the mission, you can't find anything to clean the windscreen!

6. *Fuel management*. CAP missions often require flying long distances to mission bases, and the missions themselves involve flying several sorties a day. Mission aircrews often carry a lot of luggage and equipment. Missions are flown in widely varying weather conditions. Therefore mission pilots must carefully plan, check and manage their fuel.

- a. Per CAPR 60-1, the PIC is responsible for maintaining a sufficient fuel supply to ensure landing with one hour of fuel remaining (computed at normal POH/AFM cruise fuel consumption). If it becomes evident the aircraft will not have that amount of fuel at its intended destination, the PIC will divert the aircraft to an airport that will ensure the requirement is met.
- b. Weight & Balance computations *must* be accurate. Do you include the weight of the permanent equipment stowed in the aircraft? Do you change your W&B from the standard FAA 170 pounds when a crewmember that doesn't meet the Air Force weight standards shows up? Do you have a scale available at your headquarters to weigh luggage and equipment?
- c. If you do not fill the aircraft fuel tanks to the top or a tab, do you have a means to accurately determine fuel on board? Each aircraft that is routinely filled to a level less than full should have a calibrated fuel-measuring device on board. Remember that these devices are specific to the particular aircraft!
- d. *Each CAP aircraft should have information concerning the aircraft's fuel consumption rate for various power settings, taken from actual flight conditions*. If the information is not in the aircraft, ask the aircraft's regular pilot for fuel burn rates. If neither of these options is available, be very conservative in your planning. Long cross-country flights, or a series of legs in a flight, or a series of mission sorties require careful planning. Make sure you note your assumptions (e.g., distance, power setting, and predicted wind direction and speed) so that you can compare them against actual conditions in flight.
- e. *Brief your crew, especially the observer, on these assumptions so they can assist you in managing the fuel*. The pilot or observer should ask about fuel status at least once an hour, or before departing on each leg or sortie. Are the winds as predicted, or are you facing a stronger-than-expected headwind? Is your power set at economy cruise, as you planned, or have you gone to full power because you're running late? Did the last leg take as long as you had planned, or did ATC put you in the north forty for 30 minutes for "traffic separation"?

If in doubt, *land and refuel!* Just in case, *land and refuel!*

7. *Unfamiliar aircraft equipment*. CAP aircraft are not equipped uniformly. If you are assigned to another aircraft than the one you usually fly, check the equipment. If you don't know how to use its GPS, tell air operations. If you can't set up and operate the GPS, you won't be able to use it correctly. If you try to learn "on the fly," you will spend too much time with your head inside the aircraft instead of looking outside. The same

reasoning applies to the Audio Panel, FM radio, and DF unit. In these cases, someone will probably be available to show you how to set up and operate the equipment.

Even something as simple as an unfamiliar navaid can affect safety. In most cases, just spending some time sitting in the aircraft and going over an unfamiliar comm radio or transponder will suffice. But if you've never used an HSI before, this isn't the time to learn.

Whatever you do, don't try to bluff your way through. Tell someone and ask for assistance. Another pilot can help you, or mission staff may assign another pilot or experienced observer to your crew who knows how to operate the equipment.

8. *Trainees and inexperienced crewmembers.* CAP aircrew members may be trainees, or simply inexperienced. You must take the time to ascertain the qualifications and experience level of any crewmember assigned to you.

If a crewmember is a trainee, spend extra time on briefings and be very specific as to duties and responsibilities. If the trainee is a scanner, listen in on the observer's briefing to make sure he does the same. Make sure trainees understand that, while you will teach them as much and as often as possible, you (and the observer) have duties that must not be interfered with.

If a crewmember is newly qualified or has not flown in some time, make allowances. You may have to assume some of their normal duties (e.g., setting up and operating nav aids or radios) in certain situations, so be sure to brief them so there is no confusion. For example, you may brief that you will handle all ATC communications while in Class C airspace while the inexperienced observer will handle all other communications.

Cadets and some seniors often qualify as flight line marshallers as their first mission specialty, and there is no practical way to determine their experience level. On some missions the flight line is handled by whoever is available, regardless of qualifications. Be alert and brief your aircrew to be alert. Don't hesitate to stop the aircraft if a marshaller's signals don't make sense or seem to be leading you into an unsafe situation.

9. *Low and slow.* CAP mission search patterns often require you to fly below 1000 AGL and at speeds at or below 90 knots (but never below V_x). Proficiency and planning are critical.

- a. Ensure that "low and slow" is an integral part of your proficiency program.
- b. Strictly enforce sterile cockpit rules under these conditions, and make sure your crew is briefed on all obstacles in the search area.
- c. Flying at low altitude often means losing radar and communications with ATC and mission base. Don't hesitate to climb back up to an altitude where you can make your "ops normal" reports.
- d. Maintain situational awareness and continually ask yourself, "If the engine quits now, where will I land?"
- e. CAPR 60-1 requires pilots to maintain a minimum of 500 feet above the ground, water, or any obstruction and a minimum of 2000' AGL at night (except for takeoff/landing or when under ATC control). For SAR/DR/CD/HLS reconnaissance, the pilot will maintain at least 800 AGL. Pilots may descend below the designated search altitude to attempt to positively identify the target (but never below 500 AGL); once the target has been identified the pilot will return to 800' AGL or higher. [Refer to CAPR 60-1 for special restrictions for over-water missions.]
- f. Per CAPR 60-1, minimum airspeed will be no lower than the aircraft's published best rate of climb speed (except for takeoff, landing, go-arounds, practice stalls, slow flight training and evaluation, and glider towing).
- g. Per CAPR 60-1, practice of in-flight emergency procedures and maneuvers will be conducted during daylight VMC at an altitude high enough to allow recovery from an inadvertent stall/spin entry and complete a recovery at no lower than 2000' AGL or the aircraft manufacturer, FAA, or CAP approved training syllabi recommended altitude, whichever is higher. Simulated forced landings will be discontinued prior to descending below 500' AGL, unless you intend to land.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 of the Mission Aircrew Reference Text (MART).

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART.

Brief Student: You are a Mission Pilot trainee asked about general CAP-related safety requirements and issues.

Evaluation

<u>Performance measures</u>	<u>Results</u>	
1. Concerning general CAP-related safety requirements and issues, discuss:		
a. Flying into and taxiing on unfamiliar airports.	P	F
b. Flying into large, busy airports.	P	F
c. Flying into large, busy airports.	P	F
d. Taxiing around and near a large number of aircraft.	P	F
e. Taxiing around and near a large number of aircraft.	P	F
f. Squawks.	P	F
g. Fuel management.	P	F
h. Unfamiliar aircraft equipment.	P	F
i. Trainees and inexperienced crewmembers.	P	F
j. Low and slow.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

DISCUSS TYPES OF FLIGHTS PERFORMED BY CAP AIRCREWS

CONDITIONS

You are a Mission Pilot trainee and must discuss the types of flights performed by CAP aircrews.

OBJECTIVES

Discuss the types of flights performed by CAP aircrews.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing the types of flights that CAP aircrews perform is essential. CAPR 60-1 covers the types of flights for CAP aircraft, but we want to look at a few of these in a little more detail.

Note that per CAPR 60-1, the minimum flight visibility for VFR flight in Class G airspace is three statute miles (unless the PIC is instrument current), and you must update altimeter settings hourly from the closest source.

2. *Transportation flights.* Always consult CAPR 60-1, Chapter 2 (Authorized Passengers) when you need to know who is authorized to fly as passengers in CAP aircraft and the conditions under which they are authorized to fly.

As a general rule, anyone other than CAP or US government employees need special permission to fly in CAP aircraft. All non-CAP members eligible to fly aboard CAP aircraft must execute a CAPF 9, *Release (for non-CAP Members)*, prior to the flight.

3. *Night flights.* Typical sorties flown at night are transport sorties, route searches, and DF searches (it seems these are always flown at late at night). CAPR 60-1 requires pilots to maintain a minimum of 2000' AGL at night (except for takeoff/landing or when under ATC control). During night over-water missions, both front-seat crewmembers must be CAP qualified mission pilots and both will be instrument qualified and current (the right-seat pilot need not be qualified in the specific aircraft).

As a minimum, the PIC should be night-current in the aircraft (category, class and type) you're going to fly and assure the required one-hour fuel reserve required by CAPR 60-1. When performing night searches it is preferable to have an experienced crew accompanying the pilot to assist in situational awareness and search procedures.

Night time route searches will only be successful if the downed aircraft or missing person has the capability to signal the aircraft or if an ELT has been activated. Usually, ground team searches near the LKP or intended airport stand a better chance of success. No CAP crewmember may use night vision devices during any flight operations.

The most important item when planning night sorties is the PIC. Flying at night requires more attention to preflight planning and preparation. In particular, a careful check of the weather is essential; probably the most significant problem that can occur at night is flying into weather you cannot see. Also, pay attention to the dew point spread as a predictor of fog. During the flight, maintain situational awareness and always know where you can land in an emergency.

Before you accept the mission, ask yourself a few questions:

- a. If all the night flying you have had in the last 90 days are your three takeoffs and landings, are you really proficient?
- b. How long has it been since you've done a night cross-country?
- c. How long has it been since you've done a night ELT search?
- d. If you are Instrument rated, how many approaches have you done at night lately?
- e. How familiar are you with the terrain and obstacles along the route?
- f. Since landing lights only fail at night, when was the last time you practiced landing without the landing light?
- g. Have you included all your flashlights in the weight-and-balance?

Remember that confidence is gained by experience, so you should include night flying in your proficiency regimen. You should also include periodic DF training at night.

4. *IMC flights.* CAP sorties are very seldom flown in IMC. The most common reason for an IFR flight is to transport personnel to a search area or mission base. However, it is possible to conduct a route search in IMC. If an aircraft was lost while on an IFR flight plan, a sortie may be launched along the same route with the hope of picking up an ELT signal. This approach may also be taken, with careful planning and close coordination with ATC, for aircraft lost outside prescribed IFR routes.

It is also possible to DF in IMC, but this can be dangerous and is not to be undertaken lightly. Per CAPR 60-1, IFR flights will not depart unless the weather is at or above landing minimums at the departure airport.

In any case, a few extra precautions are in order:

- a. The pilot must have completed section XIV, "Instrument Proficiency" on her Form 5.
- b. The PIC must meet FAA instrument flight proficiency requirements.
- c. The PIC should be proficient in instrument flight in the CAP aircraft to be used.
- d. For any flight other than a simple IFR transportation flight, it is highly recommended that another current and proficient Instrument-rated pilot be in the right seat. *Never* fly a search alone in IMC.
- e. Never fly an instrument search when ground teams are appropriate and available for the search.

5. *Video Imaging.* More and more, we are performing aerial reconnaissance for our partner agencies. We primarily take still photos (digital and 35mm) and video (analog and digital), and may use Slow Scan video. The mission pilot must know how to fly these missions. As SAR missions decline and the phase-out of 121.5 MHz ELTs begins, video imaging will become one of CAP's most valuable assets.

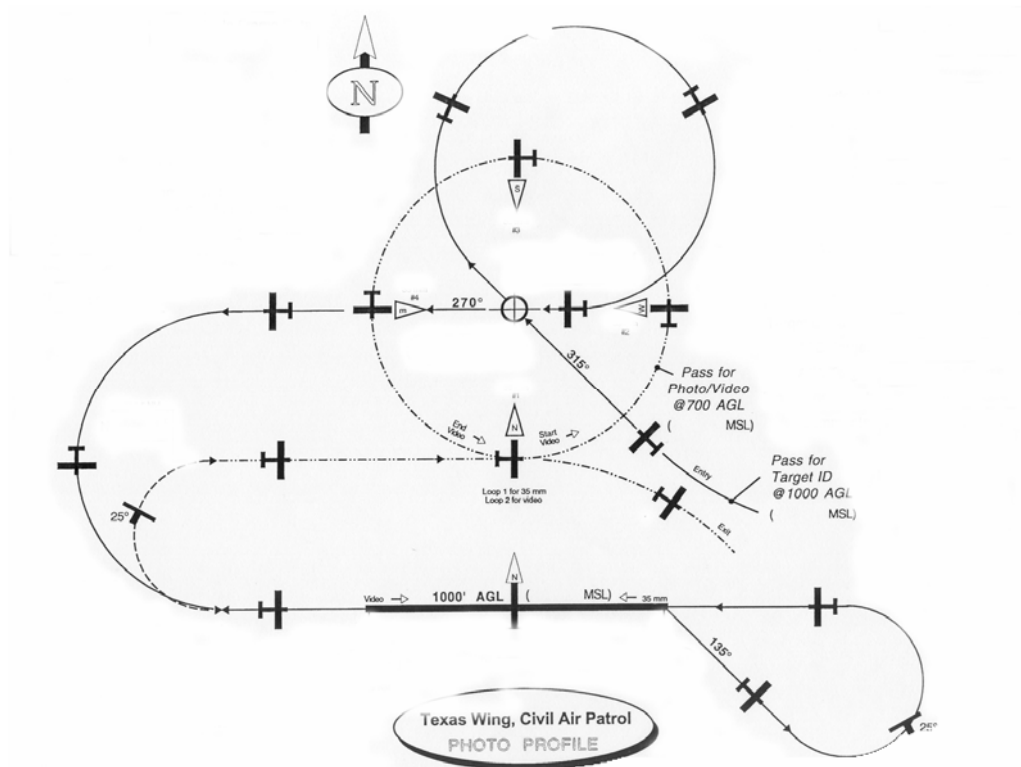
Emergency response planners expect more timely information about developing situations. These planners recognize real-time and near real-time images as an invaluable tool.

Regardless of the type of video imaging mission, there are some basics that everyone involved in the mission need to know to ensure success. The following presents the extra essentials needed for a video mission briefing:

- a. Make sure each crewmember knows what the target is and what types of images are needed. For example, a sortie may require a digital still shot of the target area for orientation, followed by a recorded video to detail egress points.
- b. Ensure the target location is identified so that you can find it.
- c. Thoroughly brief the route to and from the target, and the flight patterns within the target area. Mark them on the appropriate sectional chart and maps (e.g., road or topographical).
- d. Ensure minimum altitudes are established, both for the routes to and from the target and in the target area.
- e. Ensure all communications frequencies are well understood. This is particularly important for Slow Scan sorties.

- f. Define the duties of the PIC and the photographer when in the target area. The photographer will actually be in command of the mission and will give directions to the pilot, but the PIC retains responsibility for the safe operation of the aircraft.
- g. Ensure video equipment batteries are fully charged and that extra batteries are available.
- h. Clean the aircraft windows. If the video will be shot from the front right seat (normal), remove the window latch screw and put it in a safe place.
- i. For Slow Scan sorties, make sure the equipment is secured and properly connected. Make a test transmission before you leave the ramp.

The customer sometimes defines *video imaging flight profiles*, but a typical profile is shown and discussed below:



As the aircraft approaches the target the photographer should alert the pilot and prepare to begin photographing the target. You may need to over-fly the target first for positive identification. Assume the photographer is in the right front seat.

The first step is to take an identification photo, usually one mile south of the target from an altitude of 1000' AGL. The photographer will begin shooting as soon as the aircraft is established on this easterly route. If another pass is needed, the pilot will circle around to repeat the route.

Next the pilot will turn toward the target, descend to 500' AGL and establish a 1/2 nm circuit around the target. The photographer will be taking shots at the cardinal points of the circle, or continuously if using video. This circuit may be enlarged to fit the target area or if it is important to identify entrance and egress routes near the disaster area.

During slow-scan sorties it may be necessary to climb to a higher altitude to transmit each image.

NOTE: Never hesitate to make another pass or move to a better position if necessary to ensure the success of the sortie. Film (especially digital) is cheap and flight time is expensive; it is better to make another pass or reposition the aircraft at the scene than it is to send another aircraft back to repeat the mission.

6. *Proficiency*. CAPR 60-1 encourages pilots to maintain currency and proficiency by accomplishing a self-conducted proficiency flight at least once every 90 days (described in an Attachment, and using mission symbol C1). More specifically, mission pilots are authorized four hours of proficiency flight training per calendar month under Air Force-assigned non-reimbursed mission status (described in an Attachment, and using mission symbol B12).

When practicing in-flight emergencies, adhere to the restrictions in CAPR 60-1.

As the demands on the CAP mission pilot increase, the need to maintain and improve your mission skills becomes more important. Besides the guidance given in the CAPR 60-1 Attachments, you should also practice:

- a. Search patterns. Use the GPS as your primary tool but also practice planning and flying the different patterns using VORs and pilotage.
- b. Night proficiency. Practice search patterns at night (particularly the ELT search).

As part of your cross-country proficiency, practice with the GPS:

- a. Maintain a constant track over ground.
- b. Select/display a destination: Airport, VOR and User Waypoint.
- c. Determine heading, time and distance to a waypoint.
- d. Save lat/long coordinates as a User Waypoint.
- e. Save your present position as a User Waypoint.
- f. Enter and use flight plans.
- g. Exercise the nearest airport and nearest VOR features.
- h. Practice navigating with present position displayed (constant lat/long display).
- i. Always try to take someone along with you on your proficiency flights. This will provide excellent practice for scanners and observers, helps improve CRM and teamwork, and makes the flights more enjoyable. [Remember, if you are going to be practicing instrument approaches you must use a safety pilot. It is also preferred to have one during your night practice, although a qualified non-pilot observer will serve just as well.]

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 of the Mission Aircrew Reference Text (MART).

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART.

Brief Student: You are a Mission Pilot trainee asked about the types of CAP flights.

Evaluation

Performance measures

Results

1. Concerning types of CAP flights, discuss:

- | | | |
|---|---|---|
| a. Transportation. | P | F |
| b. Night. | P | F |
| c. IMC. | P | F |
| d. Video imaging, including the typical flight profile. | P | F |
| e. Proficiency. | P | F |

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2004
DISCUSS SECURITY CONCERNS AND PROCEDURES

CONDITIONS

You are a Mission Pilot trainee and must discuss security concerns and restrictions, and describe your actions in case of an airborne interception.

OBJECTIVES

Discuss security concerns and restrictions, and describe your actions in case of an airborne interception.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing security concerns and restrictions is essential. Additionally, you must know how to respond to an airborne interception.
2. *Security.* CAP resources should be considered National Security assets. In times of emergency you should take special security precautions to protect the aircraft and crew. Some examples are:
 - a. Hanger the aircraft whenever possible. You may place small pieces of clear tape on fuel caps, the cowlings and/or doors that will break if someone tampers with vital areas.
 - b. Pay particular attention during pre-flight inspections. Look for signs of tampering and carefully inspect the fuel for contamination.
 - c. Be as "low key" as possible, and be discrete. Don't discuss CAP business in public places.
 - d. Be aware of your surroundings at all times. If you see something or someone that is suspicious, don't ignore it. Report your suspicions to your supervisor and/or law enforcement.
3. *Airspace restrictions.* The FAA may issue Temporary Flight Restrictions at any time, so it is vitally important to ask for FDC NOTAMs before each flight and to monitor ATC for changes while in flight. TFRs were issued to establish enhanced Class B airspace, protect airspace around nuclear facilities, and protect airspace around large gatherings of people.

Even with most TSRs lifted, you should not loiter around or circle critical facilities (e.g., nuclear power plants, large stadiums or gatherings, air shows, and dams or reservoirs). If you have to circle critical facilities (e.g., for planning or actual mission purposes) make sure you coordinate with the facility's manager and ATC.

4. *In-flight Intercept.* If your aircraft accidentally approaches or encroaches restricted airspace military aircraft may intercept you; it is important to know how to respond. The following covers the important points; details can be found in AIM 5-6-2.

An intercept to identify your aircraft has three phases:

- a. Approach phase. A flight leader and wingman will coordinate their individual positions in conjunction with the ground-controlling agency.
- b. Identification phase. The intercepted aircraft should expect to visually acquire the lead interceptor and possibly the wingman during this phase. The wingman will assume a surveillance position while the flight leader approaches your aircraft. The flight leader will then initiate a gentle closure toward the your aircraft, stopping at a distance no closer than absolutely necessary to obtain the information needed. The interceptor aircraft will use every possible precaution to avoid startling you.
- c. Post-intercept phase. After you have been identified, the flight leader will turn away. The wingman will remain well clear and rejoin the leader.

If you are intercepted you should immediately:

- Follow the instructions given by the intercepting aircraft, interpreting and responding to the visual signals (see the Table below).
- Notify ATC if possible.
- Attempt to communicate with the intercepting aircraft and/or ATC on the emergency frequency 121.5 MHz, giving the identity and position of your aircraft and the nature of the flight.
- If equipped with a transponder, squawk 7700 unless otherwise instructed by ATC. If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual or radio signals, request clarification while continuing to comply with the instructions given by the intercepting aircraft.

Intercepting aircraft signal	Meaning	Intercepted aircraft response	Meaning
Rocks wings. After acknowledgement initiates a slow level turn, normally to the left, onto desired heading.	You have been intercepted. Follow me.	Rocks wings and follows.	I understand and will comply.
<i>(At night, the pilot will also flash the navigational lights at irregular intervals.)</i>		<i>(At night, the pilot will also flash the navigational lights at irregular intervals.)</i>	
Performs an abrupt breakaway maneuver consisting of a climbing 90° turn without crossing the intercepted aircraft's flight path.	You may proceed.	Rocks wings.	I understand and will comply.
Circles airport, lowers landing gear, and over-flies runway in the direction of landing.	Land at this airport.	Lowers landing gear, follows the intercepting aircraft and lands if the runway is considered safe.	I understand and will comply.
<i>(At night, the pilot will also put the landing lights on.)</i>		<i>(At night, the pilot will also put the landing lights on.)</i>	
Raises landing gear while flying over runway between 1,000' and 2,000', and continues to circle the airport.	This airport is inadequate.	If the intercepted aircraft is requested to go to an alternate airport, the intercepting aircraft raises its landing gear and uses the intercept procedures (listed above).	Understood, follow me.
<i>(At night, the pilot of the intercepted aircraft will also flash landing lights while passing over the runway.)</i>		To release the intercepted aircraft, the intercepting aircraft will perform the breakaway maneuver listed above.	Understood, you may proceed.

The pilot switches on and off all available lights at regular intervals.	Cannot comply.	Performs the breakaway maneuver listed above.	Understood.
The pilot switches on and off all available lights at irregular intervals.	In distress.	Performs the breakaway maneuver listed above.	Understood.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 of the Mission Aircrew Reference Text (MART).

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART.

Brief Student: You are a Mission Pilot trainee asked security concerns and restrictions, and your actions if intercepted.

Evaluation

Performance measures

Results

- | | | |
|---|---|---|
| 1. Discuss security concerns. | P | F |
| 2. Discuss airspace restrictions. | P | F |
| 3. Describe the phases of an in-flight intercept, and your actions. | P | F |

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

DISCUSS MISSION PILOT RESPONSIBILITIES DURING A MISSION

CONDITIONS

You are a Mission Pilot trainee and must discuss the mission pilot's responsibilities during a mission.

OBJECTIVES

Discuss the mission pilot's responsibilities during a mission.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Pilot trainee, knowing the mission pilot's responsibilities during the mission is essential.
2. *Mission Pilot and POD.* There are some factors affecting Probability of Detection (POD) that you can control:
 - a. Ask questions during briefings to ensure you *really* understand your assignment.
 - b. Take the time to plan the flight thoroughly and make sure you are prepared to fly it before leaving mission base. This knowledge enables you to concentrate on the mission and "stay ahead of the aircraft," thus increasing search effectiveness.
 - c. Maintain optimum altitude and airspeed. If you have to decrease power on a southbound leg and increase power when you turn northbound in order to maintain a constant 90 knots, then do it.
 - d. Accuracy of navigation: Use the GPS! However, you should be ready to complete the search using other navigational methods should the GPS fail.
 - e. Avoid turbulence whenever possible, avoid steep or abrupt turns, and ensure the mission commander is scheduling breaks and monitoring the scanners (and yourself) for fatigue or dehydration.
 - f. Give a thorough debriefing and be brutally honest about your effectiveness.
 - g. Stay proficient in your flying skills. Flying the aircraft and operating its equipment should be second nature, leaving you free to concentrate on accomplishing mission objectives safely.
3. *Flying the Mission.* Before missions are launched, the briefing officer provides you with information designating the routes to and from the search area, and the types of search patterns to be used upon entering the search area. Your planning should involve the observer, as they are familiar with each type of search pattern and can assist you in planning and navigation. While the observer should be scanning while you fly the pattern, they can assist you if things become confused (hey, it can happen).
4. *Number of Scanners.* Search planning, probability of detection, and search pattern effectiveness depends upon some underlying assumptions; the most important as far as the aircrew is concerned is the *assumption that there is one crewmember dedicated to scanning out the right side of the aircraft and another on the left side.*

Since the majority of CAP aircraft are Cessna 172s that only carry three crewmembers, we will assume that the crew consists of a pilot, an observer in the right front seat, and a single scanner in the rear seat. We assume that the observer will be scanning out the right side of the aircraft while the scanner covers the left side. If a larger aircraft is used there may be two scanners in the rear seat; this will allow the observer to spend more time assisting you without seriously decreasing search effectiveness.

Mission pilots must remember that they are *not* scanners. A mission pilot who tries to fly the aircraft and scan the search area at the same time is doing neither job effectively or safely. The mission pilot is responsible

for placing the scanners' eyes over the search area so they can do their job; your job is to fly the pattern precisely and effectively and for ensuring the safety of the aircraft.

Single scanner

- a. Planning and executing a search pattern with only one scanner on board is different from one where you have two scanners. You will only be able to search out one side (usually the right side) of the aircraft; this means that you must keep the right side of the aircraft towards the search area at all times. This can have a significant effect on search time and aircraft hours. For example, this would require careful planning and flying on a grid search since you will have to modify your leg entries/tracks to ensure the scanner scans the entire grid (no inverted flight, please).
 - b. Additionally, this cannot help but decrease search effectiveness due to fact that you lose the "double coverage" or overlap you get with two scanners looking out opposite sides of the aircraft. Scanner fatigue also becomes more of a factor, and search times need to be reduced to account for this.
 - c. For these reasons, performing parallel track or creeping line searches with a single scanner is not recommended. Likewise, searching any but open/flat terrain with a single scanner significantly reduces your chances of success.
5. *Flying a search pattern.* The mission pilot's contribution to a successful search is his ability to fly the search pattern precisely while maintaining altitude and airspeed. This must be done while performing the duties of a Pilot-in-Command; in the search area the most important of these duties is to "see and avoid" obstacles and other aircraft.

Another special consideration in flying search patterns is the possibility of engine trouble or failure at low altitude. The mission pilot must always be aware of where she is, the wind direction, the nature of the terrain, and where she will land if the engine fails *now*. This also underscores the importance of a thorough pre-flight inspection.

Like the rest of the aircrew, the mission pilot must continuously and honestly critique her performance during the sortie. If you're not set up properly when you enter the search area, exit and start again. If you are off by half a mile on a leg, fly the leg again. If winds and/or turbulence caused you to fly the legs erratically, emphasize this during the debriefing.

6. *Go or No-Go.* The Incident Commander has authorized your flight, you have obtained a proper briefing and flight release, you have filed your flight plan, you have completed a thorough pre-flight of the aircraft, and your crew is briefed and ready to go. *A Mission Pilot may accomplish all of this and still not be safe to fly the mission.*

How can this be? All of the regulations and safety precautions have been followed to the letter. You have been extensively trained and have demonstrated proficiency by successfully completing a Form 91 checkride. Your wing commander has appointed you as a CAP Mission Pilot!

It all comes down to the individual pilot and the circumstances. How long has it been since you've taken off in a 14-knot crosswind? Have you ever taken off or landed on an icy runway? When is the last time you've flown cross-country at night? You're signed off for instrument privileges on your Form 5, but how long has it been since you've flown in actual IMC?

Pilots, by their nature, are confident in their abilities. Sometimes over-confident. Mix in overconfidence, unusual circumstances, and the need to put all those hours of training to the test. Now add the desire to help others who are in immediate danger and you have all the ingredients for a dangerous situation.

The most effective way to break this potential accident chain is for Mission Pilots to be brutally honest about their abilities under the present conditions. Mission Pilots (as Pilot-in-Command) must have enough courage and integrity to decline a mission that they don't feel *comfortable* doing.

Additional Information

More detailed information on this topic is available in CAPR 60-1 and in Chapter 12 of the Mission Aircrew Reference Text (MART).

Evaluation Preparation

Setup: Provide the student with a current copy of CAPR 60-1 and the MART.

Brief Student: You are a Mission Pilot trainee asked your responsibilities during a mission.

Evaluation

<u>Performance measures</u>	<u>Results</u>	
1. Discuss your responsibilities during a mission:		
a. How you can improve POD.	P	F
b. Flying the mission.	P	F
c. Number of scanners onboard.	P	F
d. Flying a search pattern.	P	F
e. Go or No-Go decisions.	P	F

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.

P-2028
DISCUSS CREW RESOURCE MANAGEMENT

CONDITIONS

You are a Mission Observer trainee and must discuss Crew Resource Management (CRM).

OBJECTIVES

Discuss how CRM is used in CAP activities and missions.

TRAINING AND EVALUATION

Training Outline

1. As a Mission Observer trainee, knowing how to employ effective crew resource management is essential to safety.
2. *Situational Awareness*. Simply put, situational awareness (SA) is "knowing what is going on around you at all times." SA is not restricted to just pilots -- everyone must exhibit SA at all times. Each crewmember must have their SA at peak levels while flying because it takes everyone's awareness to keep the plane safe in flight. Scanners and observers have their own unique positions and functions that require full attention, so their SA is essential to the safe operation of any CAP flight.

Examples of good SA attitudes are:

Good mental health, where each crewmember is clear and focused.

Good physical health: this includes fatigue, sickness, hydration, and stress factors.

Attentiveness: keep your attention on the task at hand.

Inquisitiveness: always asking questions, challenging ideas, and asking for input.

Examples of SA skills:

Professional skills developed through training, practice and experience.

Good communication skills. These are necessary to effectively get your point across or receive valid input.

Interpersonal skills such the basic courtesies factor greatly into how a crew will get along, and this will greatly impact crew effectiveness and performance.

To help prevent a loss of SA, use the "IMSAFE" guidelines. This checklist was developed for the FAA as a quick memory guide for aviators to run through and make self-determination as to their fitness to fly. If a crewmember says yes to any of these, they really shouldn't fly.

There are a number of standardized tools that can help improve CRM and overcome a loss of situational awareness. When a crew loses SA it is critical to reduce workload and threats:

- a. Suspend the mission. [Remember to "Aviate, Navigate and Communicate."]
- b. Get away from the ground and other obstacles (e.g., climb to a safe altitude).
- c. Establish a stable flight profile where you can safely analyze the situation.

Once we have lost situational awareness, or recognized the loss in another crewmember, how do we get it back? A few methods are to:

- a. Listen to your gut feelings. If it acts like an idiot and talks like an idiot, then its probably an idiot.

- b. *Use terms like "Time Out" or "Abort" or "This is Stupid."* Once terms like these are called, the pilot should terminate the task or maneuver, climb away from the ground if necessary, establish straight-and-level flight and then discuss the problem. [The term you use should be agreed upon before the flight.]
- c. *Keep the cockpit sterile* -- keep talk to the minimum necessary for safety, particularly during taxi, takeoff, departure, low-level flying, approach, and landing. This helps remove distractions and keep everyone focused on the important things.

3. *Barriers to Communication.* Rank, gender, experience level, age, personality, and general attitudes can all cause barriers to communication. You may occasionally be hesitant to offer an idea for fear of looking foolish or inexperienced. You may also be tempted to disregard ideas that come from individuals that have a lower experience level. If you are committed to teamwork and good crew coordination, you must look through such emotions and try to constructively and sensitively adapt to each personality involved.

You can deal best with personalities by continually showing personal and professional respect and courtesy to your teammates. Criticism will only serve to build yet another barrier to good communication. Nothing breaks down a team effort faster than hostility and resentment. Always offer opinions or ideas respectfully and constructively. Instead of telling the pilot, "You're wrong," tell him what you *think* is wrong, such as "I think that new frequency was 127.5, not 127.9."

Personal factors, including individual proficiency and stress, may also create barriers to good communication. Skills and knowledge retention decrease over time, and that is why regular training is necessary. If you don't practice regularly, you very likely will spend a disproportionate amount of time on normal tasks, at the expense of communication and other tasks. Civil Air Patrol, the FAA, commercial airlines, and the military services all require certain minimum levels of periodic training for the sole purpose of maintaining proficiency.

Stress can have a very significant, negative effect on cockpit communication. An individual's preoccupation with personal, family, or job-related problems distracts him or her from paying complete attention to mission tasks and communication, depending upon the level and source of stress. The flight itself, personalities of the individuals, distractions, flight conditions, and individual performance can all be sources of communication-limiting stress. When stress reaches very high levels, it becomes an effective barrier to communication and job performance. Many fliers and medical specialists advocate refraining from flying or other complex tasks until the stress is removed.

Part of your job is also to recognize when others are not communicating and not contributing to the collective decision-making process. Occasionally, other crewmembers may need to be actively brought back into the communication process. This can often be done with a simple "What do you think about that?" In a non-threatening way, this invites the teammate back into the communication circle, and, in most cases, he or she will rejoin the information loop.

4. *Task Saturation.* At times, crews or individual members may be confronted with too much information to manage, or too many tasks to accomplish in the available time. This condition is referred to as *task saturation*. This will most likely happen when a crewmember is confronted with a new or different situation such as an emergency, bad weather, or motion sickness. Preoccupation with the different situation may then lead to a condition of "tunnel vision," where the individual can lose track of many other important conditions. In an advanced state, comprehension is so far gone that partial or complete *situational awareness* is lost. When individuals are task saturated to this extent, communication and information flow usually ceases.

If you begin to feel overwhelmed by information or the sheer number of things to do, it's time to evaluate each task and do only those tasks that are most important. If you ever feel over-tasked, you have an obligation to tell the other crewmembers *before* becoming task-saturated and losing your situational awareness. If others know your performance is suffering, they may assume some of the workload, if they are able. Once the most

important tasks are accomplished and as time permits, you can start to take back some of those tasks that were neglected earlier. Allocation of time and establishing priorities is known as *time management*.

Most people can recognize task saturation and understand how it can affect performance. However, you should also watch for these symptoms in other members of your crew and take over some of their responsibilities if you have the qualifications and can do so without placing your own duties at risk.

The pilot's job is to safely fly the aircraft, and you should be very concerned if he or she becomes task saturated, or spends an excessive amount of his time with tasks other than flying the airplane. No crewmember should ever allow the work management situation to deteriorate to such an extent as to adversely affect the pilot's ability to continue to safely operate the aircraft. Many preventable accidents have resulted from crews' entire involvement in other areas or problems, while the airplane literally flew into the ground. If any crewmember suspects pilot task saturation to be the case, nonessential discussion should cease, and the crew as a whole should discontinue low-priority aspects of the job, and even return to the mission base if necessary.

5. *Assignments and Coordination of Duties.* Assignment of aircrew duties is based on CAPR 60-3. All flight-related duties are conducted under the supervision of the aircraft commander. Mission-related duties may also be conducted under the supervision of the aircraft commander, but a properly trained observer can also fill the role of mission commander. The key is that positive delegation of monitoring duties is as important as positive delegation of flying duties. As previously discussed, it is very important for each crewmember to know what they are supposed to be doing at all times and under all conditions. Aircraft safety duties vary with the start up, taxi, takeoff, departure, transit, approach and landing phases of flight. Mission duties are related to the mission objective, primarily to fly the aircraft safely and precisely (the pilot) and to scan effectively (scanners and observers).

Close attention should be paid during the pilot's briefing. The pilot will establish flight-specific safety "bottom lines" at this time, such as emergency duties and division of responsibilities. Each individual must again clearly understand his specific assigned duties and responsibilities before proceeding to the aircraft.

Other phases of the flight also require that distractions be kept to a minimum. Recent air transport industry statistics show that 67% of airline accidents during a particular survey period happened during only 17% of the flight time -- the taxi, takeoff, departure, approach and landing phases. The FAA has designated these phases of flight as critical, and has ruled that the cockpit environment *must* be free of extraneous activity and distractions during these phases to the maximum extent possible (the sterile cockpit).

In assigning scanning responsibilities to the scanners, mission observers must be receptive to questions and suggestions from the scanners. Carefully consider suggestions and understand that suggestions are almost always offered constructively, and are not intended to be critical. Answer questions thoroughly and openly, and don't become defensive. All doubts or questions that you can't answer should be resolved as soon as possible. It is critical to remember that CRM encourages the flow of ideas, but the Mission Pilot must make the final decision based on the crew's input.

Additional Information

More detailed information on this topic is available in Chapter 14 of the MART.

Evaluation Preparation

Setup: None.

Brief Student: You are a Mission Observer trainee asked to discuss CRM.

Evaluation

Performance measures

Results

- | | | |
|--|---|---|
| 1. Discuss situational awareness and how to regain SA once it is lost. | P | F |
| 2. Describe barriers to communication. | P | F |
| 3. Discuss task saturation and strategies to minimize it. | P | F |
| 4. Discuss crew assignments and coordination of duties. | P | F |

Student must receive a pass on all performance measures to qualify in this task. If the individual fails any measure, show what was done wrong and how to do it correctly.